CHAPTER 5

ASSOCIATED LAUNCHING EQUIPMENT

The associated launching equipment discussed in this chapter is used in conjunction with catapults and arresting gear. This equipment includes the jet blast deflectors and nose gear launch equipment.

Upon completing this chapter you should be able to do the following:

Ž Identify procedures for operating jet blast deflectors (JBDs) for normal and for emergency operations.

Ž Describe the bulletins used in launching operations.

Ž Describe the operation and function of the Mk 2 nose gear launch system.

JET BLAST DEFLECTORS

There are two basic types of jet blast deflectors (JBDs) in use in the fleet. They are the Mk 6 and the newer Mk 7. See table 5-1. The purpose of all JBDs is to protect personnel, equipment, and other aircraft from the hot exhaust gases coming from the aircraft that is about to be launched from a catapult (see fig. 5-1).

Table 5-1.—Mk 6 Mod 2 and Mk 7 Mod 0 Comparison Chart

Mk 6 Mod 2			
ITEM	**DESCRIPTION**	**DATA**	
Panel Cooling	Sea Water	40 psi min inlet press	
Hydraulic Source	Catapult Hyd Sys	2700 psi (C7 and C11-1 catapults) 2500 psi (C13, C13-1, and C13-2 catapults)	
Panel	Dimensions	Slant Height	10 ft (Mk 6 Mod 2) 10 ft 5 in. (Mk 6 Mod 2 Modular)
		Width	12 ft (Mk 6 Mod 2) 5 ft 11 in. (Mk 6 Mod 2 Modular)
	Operating Speed	Up	5 sec max
		Down	8 sec max
Mk 7 Mod 0			
ITEM	**DESCRIPTION**	**DATA**	
Panel Cooling	Sea Water	90 psi min inlet press	
Hydraulic Source	Catapult Hyd Sys	2,500 psi	
Panel	Dimensions	Slant Height	14 ft
		Width	5 ft 11 in.
	Operating Speed	Up	6 sec max
		Down	8 sec max

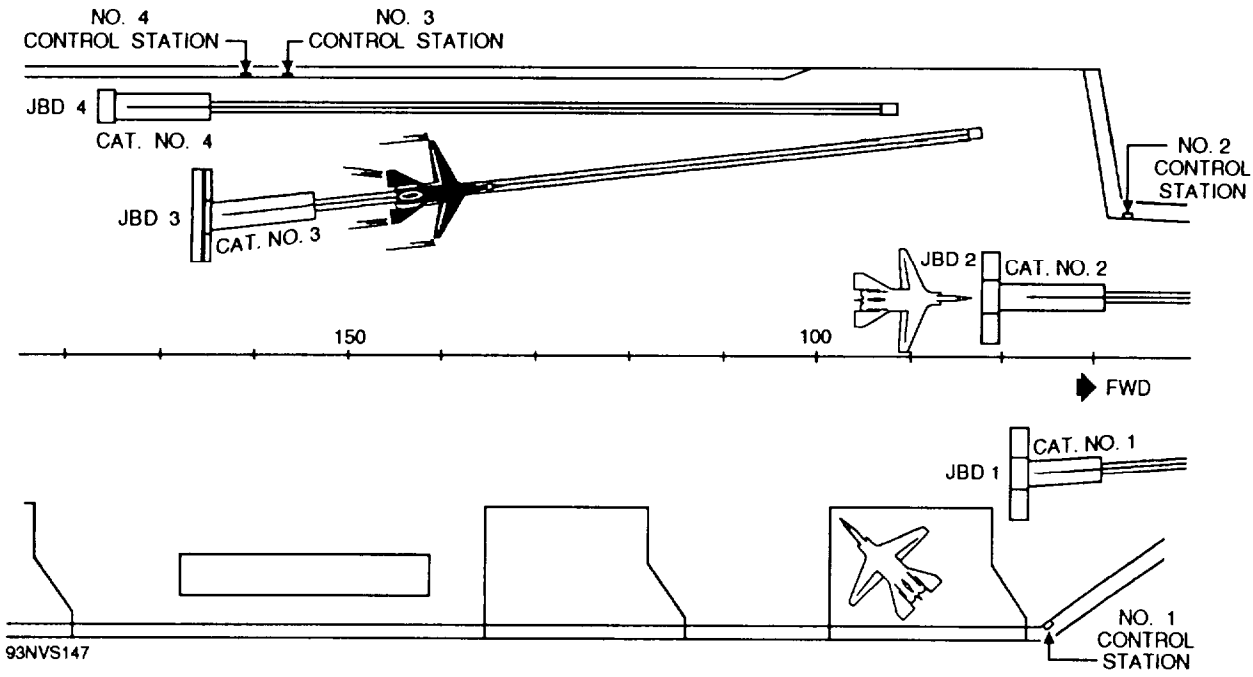

Figure 5-1.—General arrangement of jet blast deflectors.

There are various modifications of JBDs in use. Each type of JBD is identified by a model number, such as Mk 6 Mod 1, Mk 6 Mod 2, and Mk 7 Mod 0. The most common types of JBDs in use are the Mk 6 Mod 2, Mk 7 Mod 0, and Mk 7 Mod 1. However, since Mk 6 Mod 1, Mk 6 Mod 3, and Mk 7 Mod 2 JBDs are also in use, you will need to consult the specific NAVAIR technical manual for the type of JBD installed on your ship. The Mk 7 Mod 0 JBD is discussed in this chapter to familiarize you with the general operation and maintenance of JBDs.

MK 7 MOD 0 JET BLAST DEFLECTOR

The Mk 7 Mod 0 JBD consists of six water-cooled panels and three operating gear assemblies. Each operating gear assembly is connected to a pair of panel assemblies. The panel assemblies operate in pairs and may be raised or lowered independently or simultaneously with others in the same installation. This allows for deck equipment mobility.

The electrical, hydraulic, and mechanical equipment needed to operate the panels are located under the panel installation. When the panel is lowered, the JBDs serve as part of the deck over which an aircraft passes on its way to the catapult. When the panel is raised behind the aircraft, the panels deflect the heat and high-velocity exhaust gases generated by the aircraft's engines upward and away from personnel and other aircraft.

All Mk 7 JBD installations are electrically controlled by a deckedge control panel or a portable control box. Each control panel (fig. 5-2) has its own electrical installation and is independent of the other installations. Most JBD assembly installations are controlled by a portable electrical system consisting of portable control boxes and umbilical cables (fig. 5-3). Each portable control box operates independently and will only control the JBD installation identified on its faceplate. An auxiliary control panel and transfer switch are provided for emergency operations, and they are located in the retraction-engine machinery room.

Operating Gear Assembly

The JBD panel assemblies are raised and lowered by an operating gear linkage assembly and a hydraulic cylinder located just under each panel cutout in the deck. The operating gear linkage

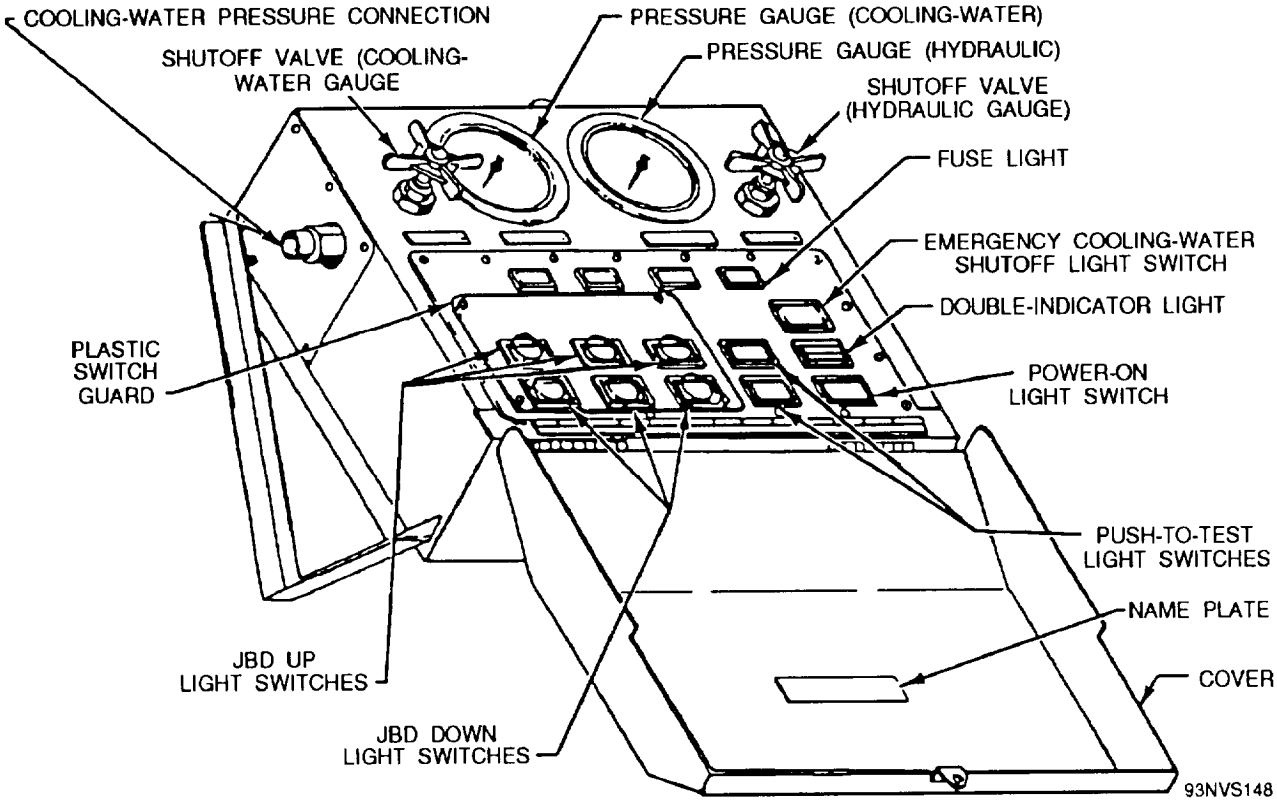

Figure 5-2.—Deckedge control panel (Mk 7 Mod 0/Mod 2).

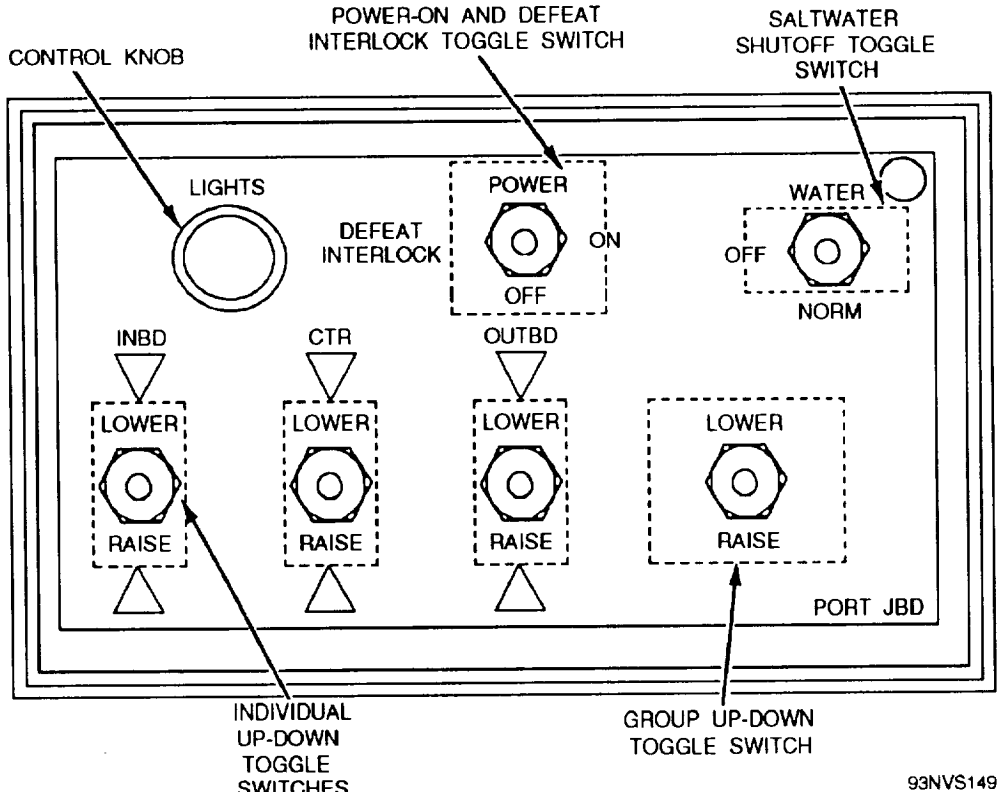

Figure 5-3.-Portable electrical system control box (Mk 7 Mod 0/Mod 2).

assembly (fig. 5-4), consisting of two arms, two struts, and two eye assemblies, is attached to a panel. Since the panel assemblies are operated in pairs, the linkages for two panels are attached to a single trunnion shaft that is mounted in three bearing block assemblies. Two hydraulic cylinders are attached to the trunnion shaft by crank assemblies, and the shaft is rotated by the push-and-pull operation of the hydraulic cylinders. Shaft rotation extends or retracts the linkage to raise or lower the panels. This configuration is designed so that in the event that one of the hydraulic cylinders fails, the other cylinder will raise or lower the pair of panels.

Magnets on the operating linkage actuate the limit switches mounted below the deck that provide an indication of JBD position.

Water-Cooled Panel Assembly

A water-cooled panel assembly (fig. 5-5) is a reinforced ribbed aluminum alloy panel structure with a water manifold installed on each side. It consists of 14 tube assemblies and 7 removable module assemblies and is bolted on hinge and lift fittings. The module assemblies are fastened to the panel base assembly by screws, which permit easy removal in the event of module failure. Each module has water passages that are connected to the inlet and discharge water manifolds by tube

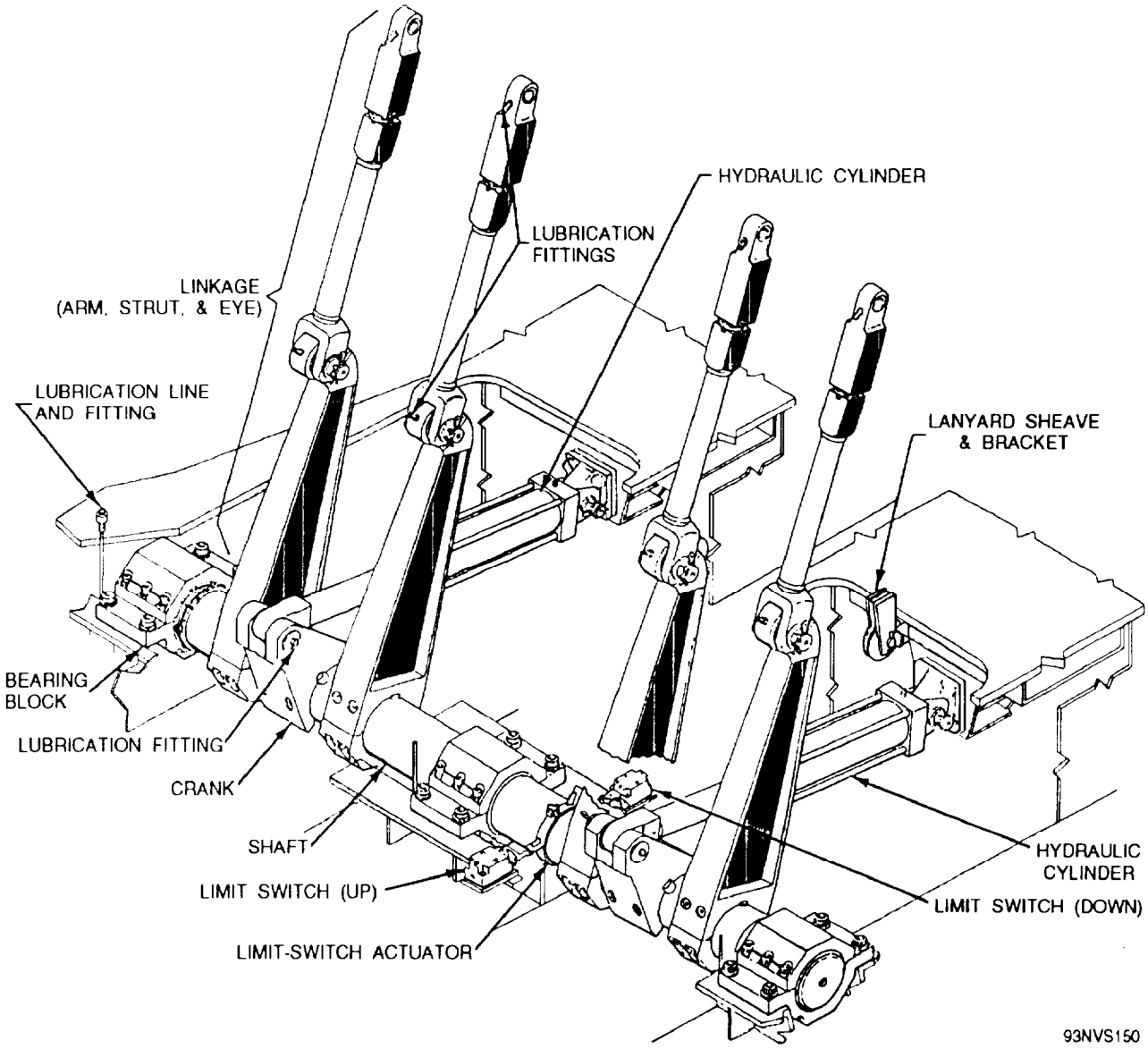

Figure 5-4.—Operating gear assembly.

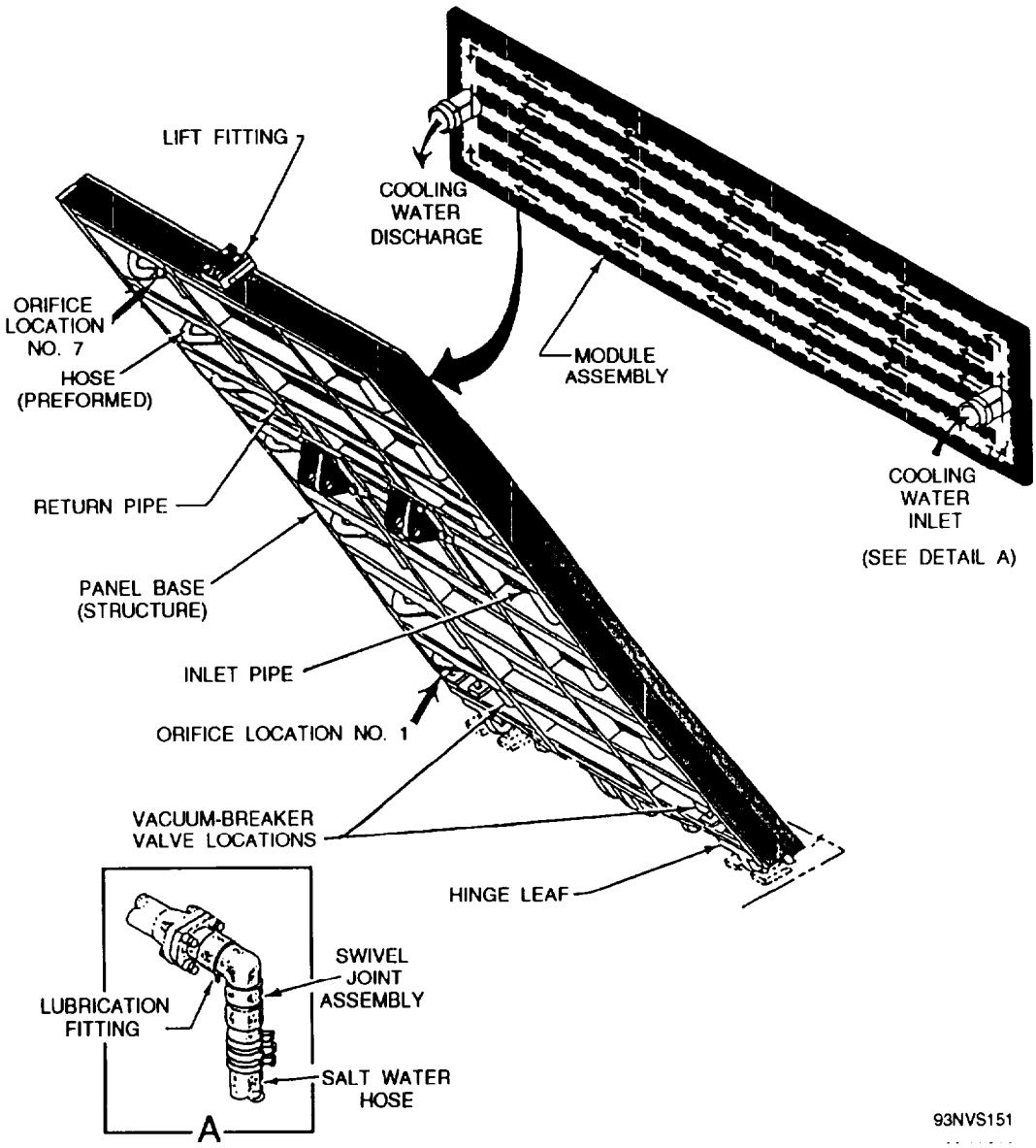

Figure 5-5.—Water-cooled panel assembly.

assemblies. Orifices, located at the discharge pipe tube connection, control the flow of water through the module assemblies. The continuous circulation of water dissipates the heat absorbed by the module from the aircraft exhaust.

The ship's fire main system supplies salt water to the JBD cooling system. An in-line strainer filters out particles that could clog the water passages of the module assemblies. The salt water, under 90 psi minimum pressure, enters the inlet pipe of each panel base assembly through a swivel joint and saltwater hose connection (see fig. 5-5, detail A) and then into each of the module assemblies. The salt water exits through the discharge pipe at the opposite side of the panel assembly and out through another hose connection into the saltwater discharge overboard piping (fig. 5-6).

Hydraulic System

The catapult main hydraulic system supplies hydraulic fluid to the JBD hydraulic system. This catapult main hydraulic pressure is directed to three four-way control valves. The four-way valves control the flow of hydraulic fluid to and from the JBD hydraulic cylinders (see fig. 5-7). Each four-way control valve assembly consists of a subplate, sequenece valve, pilot operated control valve, and a direct solenoid-operated control valve. Each

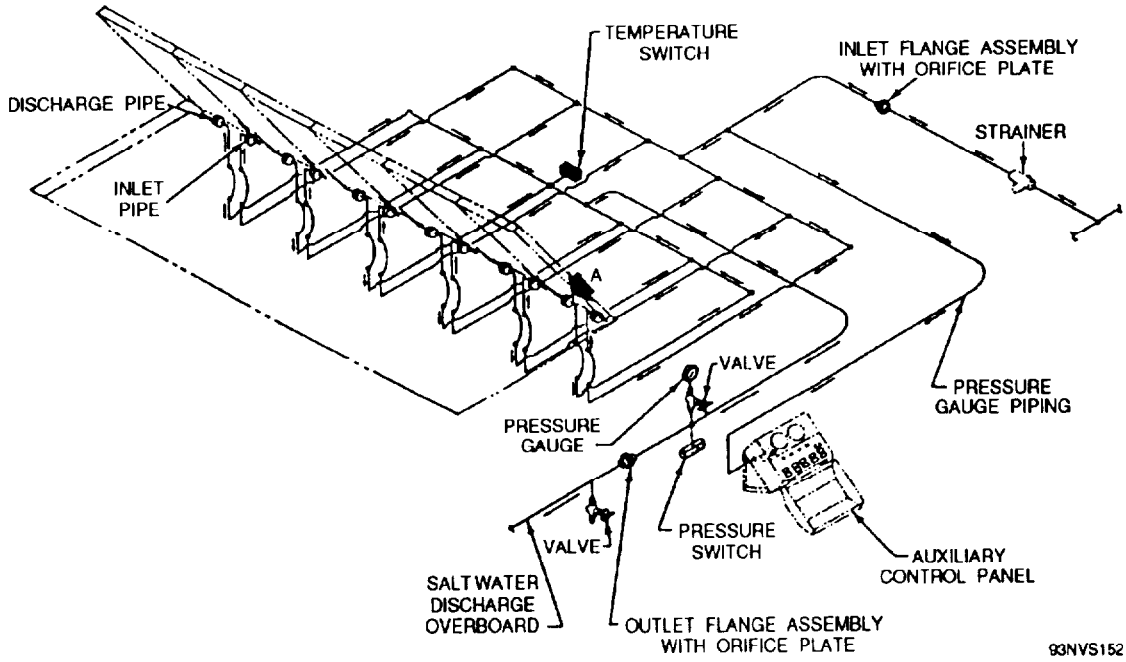

Figure 5-6.—Cooling water piping assembly (Mk 7 Mod 0).

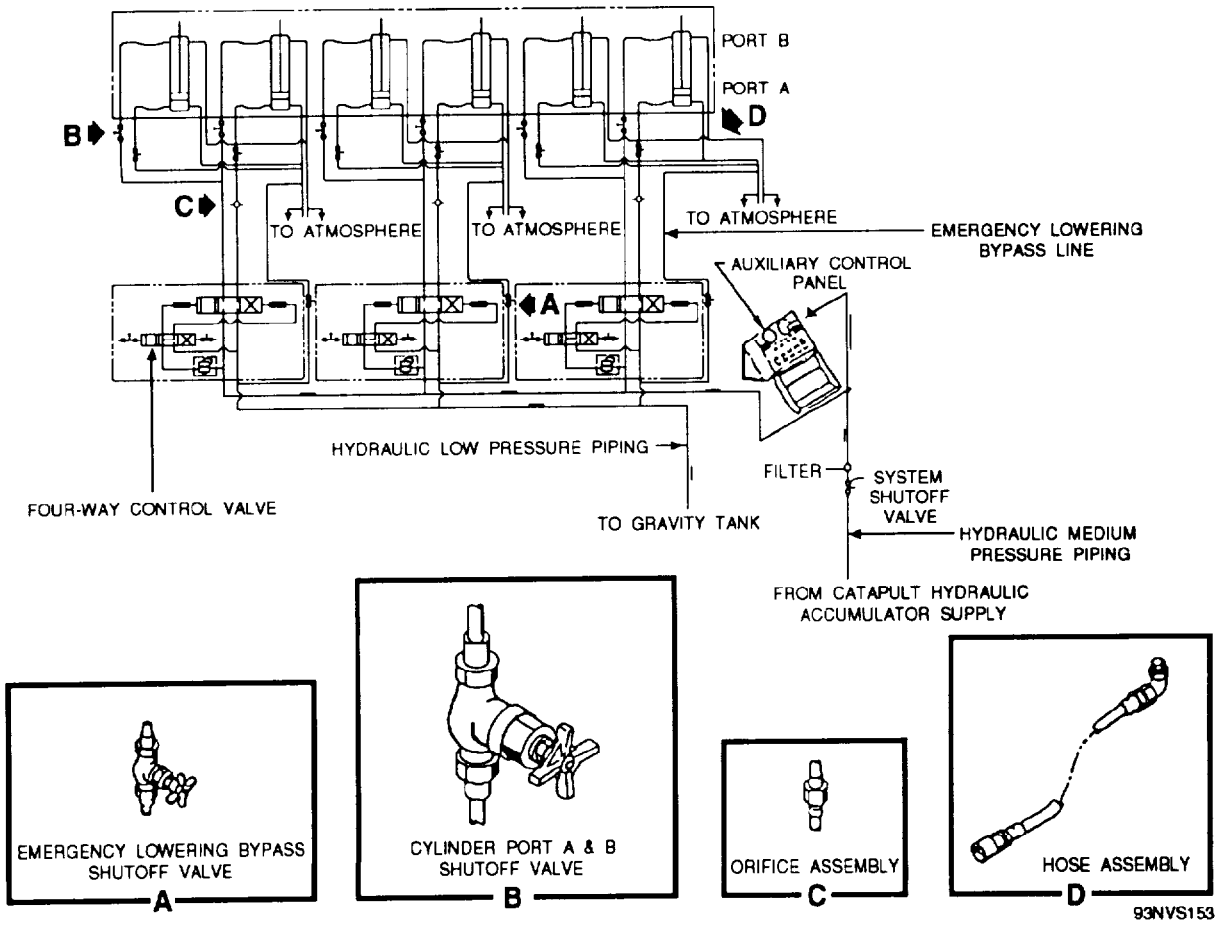

Figure 5-7.—Hydraulic control piping assembly (Mk 7 Mod 0).

solenoid unit has a manual override for emergency operation.

Emergency lowering bypass lines are connected to the raising side of the hydraulic cylinder vent piping assembly (fig. 5-8), and to the return lines of the gravity tank. The bypass lines permit fluid passage around the four-way control valves and are only used during an emergency situation to lower the JBD panels.

Control System

The Mk 7 Mod 0 portable electrical system control box (fig. 5-3) has six toggle switches. Three of the toggle switches are used to raise or lower individual pairs of JBD panel assemblies; the group up-down toggle switch simultaneously raises or lowers all of the panels in an installation; a power on/interlock defeat toggle switch; and the cooling water shutoff toggle switch closes or opens a remote control shutoff valve located in the saltwater supply line to the applicable JBD installation.

Lights are provided above and below the raise (amber) and lower (green) switches to indicate the JBD panel position. A red light, near the emergency cooling water shutoff switch, indicates a malfunction in the cooling water system.

The umbilical cable connects to a receptacle on the bottom of the control box and to a receptacle in the flight deck. Wiring from the deck receptacle goes to a junction box containing four terminal boards; this junction box is the distribution point for the portable electrical system and control box circuitry.

A transfer switch is also provided for each JBD installation so that in an emergency, electrical control can be transferred from the portable control box to the applicable auxiliary panel. This transfer switch (fig. 5-9) is a rotary-type switch with a rotary dial. The dial face is marked with two portable and two auxiliary positions. When the transfer switch is in the PORTABLE position, the portable electrical control box is operational. Rotating the switch to the AUX position will disconnect the portable electrical control box and transfer operations to the auxiliary control panel.

Preparation for Use

When the JBDs are put in operation for the first time or after being idle, use the following procedures:

1. Perform the preoperational inspection according to the applicable maintenance requirement card (MRC).

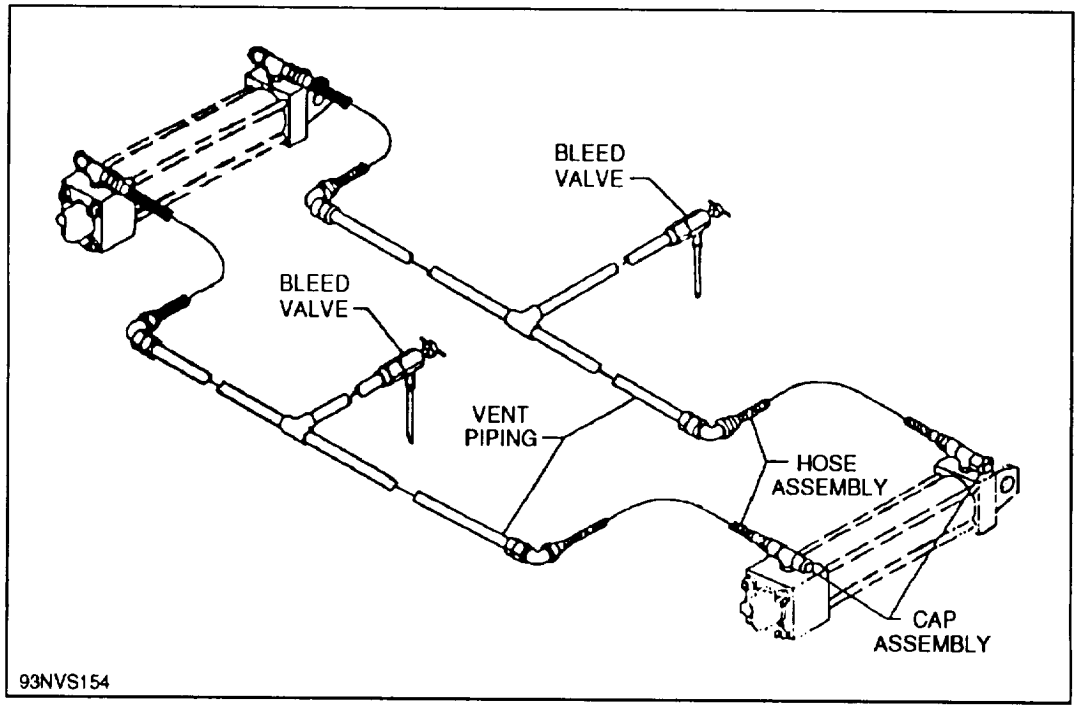

Figure 5-8.—Cylinder vent piping assembly.

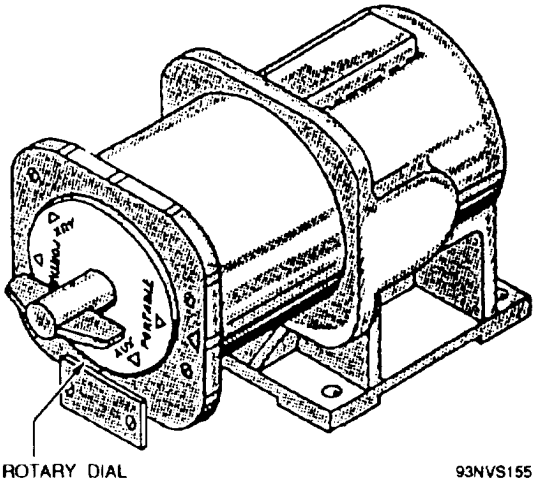

Figure 5-9.—Transfer switch (portable electrical control system).

2. Ensure that personnel, aircraft, and flight deck equipment are clear of the panel area before attempting to raise the deflector panel(s).

CAUTION

Damage by excessive heat can result from jet engine exhaust if cooling water is not flowing at the correct pressure.

3. Check to ensure saltwater supplied from the ship's fire main is flowing through the water-cooled panels.

4. Functionally test the JBD hydraulic and electrical system for proper operation and leaks.

EMERGENCY OPERATION PROCEDURES

In the event of an emergency or a malfunction, the procedures discussed in the following paragraphs must be followed.

Electrical Control Failure

Should the portable electrical control system box, deckedge, and auxiliary control panels become affected by an electrical power failure and the hydraulic system is functional, proceed as follows:

1. Station a crewperson to act as a valve operator at the four-way control valves in the catapult retraction-engine machinery room. The valve operator shall be equipped with a sound-powered phone set. The JBD deckedge or portable control box operator shall remain at his or her station and relay instructions to the valve operator. The JBD deckedge or auxiliary panel operator shall also monitor the pressure gauges.

2. The valve operator, when instructed by the JBD deck operator, shall raise or lower the JBD panels by operating the manual overrides on the A and B solenoids of the three four-way valves. The B solenoid controls the raising of the panels and the A solenoid controls the lowering.

NOTE

The catapult officer, at his or her discretion, may assign two additional crewpersons as valve operators to expedite the operation of the applicable JBD assembly. Instructions are relayed to them by the first valve operator equipped with a phone set.

Hydraulic Control Failure

Should the JBD hydraulic system fail with the JBDs in the FULL-UP position, the following procedures must be used to lower the panels.

1. Establish sound-powered phone communication between the machinery room and deckedge control/center deck station.

WARNING

Ensure all tag-out procedures are according to current shipboard instructions.

2. Close the main supply valve and attach a safety tag.

3. Open the vent (bleeder) valves to the lowering chambers of the hydraulic cylinders. Open the applicable emergency bypass valves one-quarter turn or as necessary to control the lowering speed of the panel.

WARNING

Be sure that no personnel, including the person holding the panel emergency lowering device, are under the panel before proceeding.

4. Using the panel emergency lowering device, place the fitted end against the panel linkage arm and attach the ring end to a tractor tow pintle. Push with the tractor until the operating gear linkage unlocks. Remove the panel emergency lowering device.

5. Adjust the panel lowering speed by opening/closing the emergency bypass valve.

6. After hydraulic failure is corrected, perform the following:

a. Shut the vent valves to the top cylinder chambers.

b. Remove the safety tag and open the main fluid supply valve.

c. Raise the panels, opening and shutting the vent valves as necessary to remove air from the top cylinder chambers.

7. Return the equipment to the readiness condition.

Inoperative Deckedge Control Panel or Portable Electrical System Control Box

In the event of an emergency where the deckedge control panel or portable electrical system control box cannot be used, the auxiliary control panel in the catapult retraction-engine machinery room is made operational.

1. Station a crewperson at the deckedge or flight deck to man a phone and relay instructions to the auxiliary-control-panel operator.

WARNING

The crewman, acting as a safety observer, should ensure that the area around the JBD is clear of aircraft, yellow gear, and personnel.

2. With the transfer switch in the AUX position, the auxiliary-control-panel operator shall operate the panel by the instructions relayed to him or her from the deck edge or flight deck.

CAUTION

Repair and checkout of the faulty panel or control box operation shall be accomplished at times when the raising or lowering of the JBD would not be prohibited by aircraft movement on the flight deck.

3. Continue operation of the auxiliary control panel until the faulty deckedge control panel or portable electrical system control box is completely checked out and restored to proper operating condition.

WARNING

Prior to returning control back to deck operation, verify with the flight deck safety observer that the area around the JBD is clear of aircraft, yellow gear, and personnel.

4. Return control of the JBD to the deckedge or portable control box operator.

MAINTENANCE

This section contains preventive and corrective maintenance information and procedures, some of which are general and apply to various items of the system and others of which are specific and apply to a particular part of the equipment.

Planned Maintenance

The planned maintenance system furnishes all vessels and stations with MRCs containing specific maintenance instructions. These cards are used at required frequencies to maintain JBD equipment in operating condition and to prevent breakdown and subsequent shutdown of operations. The planned maintenance system and the maintenance data collection system are described in OPNAVINST 4790.4.

Current MRCs include the following inspection and cleaning procedures:

1. Preoperational inspections

2. Postoperational inspections

3. Cleaning and inspecting hydraulic piping orifice plate(s)

WARNING

Before performing any maintenance procedures behind a JBD panel in the raised position, install three supports to prevent the panel from lowering. Failure to do this could result in serious injury to personnel.

To ensure dependable operation of the JBD equipment, proper lubrication of the mechanical linkage is essential. Lubrication is part of the preoperational checks given in an MRC. Extension tubes are provided on trunnion bearings and hydraulic cylinder bracket assemblies so that all lube fittings can be reached from the deck.

PROTECTING OPEN EQUIPMENT. —When removing a component from the hydraulic system, cap or plug all openings to prevent entry of foreign matter. Use tape to protect pipe threads.

CLEANING. —Hydraulic system components must be disassembled, cleaned, repaired, and reassembled as specified in the operation, maintenance, and overhaul instructions manual for the specific type of JBD installation on your ship.

WARNING

Before repairing or removing any components connected to hydraulic or water lines, make sure the lines are repressurized. Also, before repairing or removing any electrical component, de-energize the electrical circuit and attach an out-of-service tag.

HOSES, SEALS, AND O-RINGS. —Hoses, seals, and O-rings are selected on the basis of their compatibility with the hydraulic fluid. Therefore, replacement parts should be of the same material as original parts. O-rings must be removed and replaced with care to avoid damage to the O-ring and O-ring sealing surfaces of the various parts. O-rings must be free of cuts and not deformed. New O-rings must be installed at every reassembly of components. Before assembly, all O-rings must be lightly lubricated with the system hydraulic fluid. Hoses are subject to wear and require periodic replacement. When installing hoses, take care to avoid unnecessary bends and overstressing.

To restore the JBD system to operating condition after a down period that required draining of fluid, perform preoperational inspection procedures given in the applicable MRC.

For most repairs to the hydraulic system, only portions of the system need be drained. Isolation valves in each of the hydraulic cylinder lines, manifold shutoff valves, and a shutoff valve between the filter and the catapult pumps permit isolation of portions of the JBD hydraulic system.

The entire JBD system can be drained, if necessary, by closing only the shutoff valve, venting the high points, setting the four-way valves at UP or DOWN, and draining at the filter.

Drive Mechanism Maintenance

If drive mechanism mechanical parts are damaged or require replacement because of wear, proceed as follows:

1. Relieve hydraulic system pressure.

2. Support or block the link, arm assembly, hydraulic cylinder, and all other components that may fall free when unfastened or when pins are removed.

3. Support the panel with three supports.

4. Remove the pin that connects link and arm assembly. Examine the bushing of the arm assembly for wear, and replace it if necessary.

5. Remove the pin that connects the panel and link. Examine the bushing of the panel lug assembly for wear, and replace it if necessary.

6. Remove the pin that connects the clevis and crank assembly. Examine the bushing for wear, and replace it if necessary.

7. Disassemble the crank assembly and remove it from the trunnion shaft. Examine the key and key slots for wear, and replace the worn parts if necessary.

8. Disassemble the arm assembly and remove it from the trunnion shaft. Examine the key and key slots for wear, and replace the worn parts if necessary.

9. Disassemble the trunnion bearing. Examine the bearing set for wear, and replace it if necessary.

Reassemble the linkage as follows:

1. Connect the clevis and crank assembly.

2. Connect the link to the panel.

3. Connect the link to the arm assembly.

Check over-center locking as follows:

1. Move the linkage over-center until the arm assembly and the link are locked in over-center position.

2. The piston of the hydraulic cylinder should be within 1/2 inch of the bottom. If it is not, turn the clevis on the threaded piston rod to obtain the required measurement.

Troubleshooting

Most problems that occur on JBDs can be recognized as a failure of one of three systems—namely, hydraulic, electrical, or water.

Information that allows operating and maintenance personnel to locate the source of problems or equipment failure is found in the JBD technical manual, in the section covering malfunctions.

SAFETY PRECAUTIONS

The energy required to operate the JBD is supplied by fluid under pressure; therefore, when operating with fluid under pressure, observe standard safety precautions that apply.

All moving parts and equipment should be checked for rags, tools, or other foreign material before operating any of the machinery. Only qualified operators shall be allowed to operate the blast deflector.

The parking of aircraft on the deflector panel should be avoided. The panels are designed to withstand only the temporary weight of the aircraft taxiing over them.

When you perform maintenance on the JBD, comply with the safety precautions listed on the MRC.

Personnel and equipment shall be clear of the JBD machinery enclosure and depressed deck when the panels are being raised or lowered. This includes the times when the panels are being operated during preoperational inspections and maintenance or overhaul tests and inspections.

LAUNCHING ACCESSORIES

Each type or series of aircraft requires a specific hookup configuration. It is essential that the right hookup procedures and equipment are used for each aircraft. The following list contains some of the most important bulletins available that list the requirements for proper hookup procedures and usage of various accessories:

1. *Catapult Deck Gear Accessories Service Bulletin 226.*

This bulletin serves as a guide for the proper hookup procedures for all carrier-based aircraft. Included are photographs, supplemented by pertinent hookup instructions, and hookup discrepancies to be avoided.

2. Catapult Deck Gear Accessories Service Bulletin 235.

This bulletin contains information concerning proper lanyard configurations and attachment instructions for all bridle/pendants used with the Mk *2* and Mk 4 bridle arresters.

3. Aircraft Launching Bulletin 0-12.

This bulletin contains information concerning the various accessories used in launching aircraft. It consists of usage requirements and limitations on all launching accessories.

It is imperative that the correct deck gear be used to ensure safe launching operations. In addition, certain inspections must be performed to ensure that the equipment meets the inspection criteria established by the applicable MRCs.

MK 2 NOSE-GEAR-LAUNCH SYSTEM

The nose-gear-launch (NGL) equipment is designed to assist in the launching of aircraft by providing a positive and automatic means of attaching the aircraft launch bar to the catapult shuttle and spreader. This means of aircraft "hookup" enhances flight deck safety by minimizing the number of catapult personnel required to be near the aircraft during launching operations. The major components of the Mk 2 NGL system include the flush-deck guide track, slide assembly, actuator reset assembly, shuttle spreader, and buffer cylinder assembly. These components and their operation arc discussed in the following paragraphs.

NOSE-GEAR-LAUNCH GUIDE TRACK

The flush-deck track (fig. 5-10), which guides the aircraft launch bar into engagement with the catapult shuttle spreader assembly, has an approach track, buffer-cylinder track, aft slide-access track, forward slide-access track, and a forward track. The approach track contains a V-shaped mouth to ease engagement of the launch bar and guide it into the track.

As the aircraft moves forward, the launch bar slides in grooves constructed in each track. Inserts, to provide a caroming surface, are installed in both the forward slide-access track and the forward track. These inserts ensure that the aircraft launch bar makes positive contact with the buffer hook actuator roller and that the launch bar is guided properly into the spreader assembly. A track seal is installed during bridle-launch operations and when the catapult is not operating.

NOSE-GEAR-LAUNCH SLIDE

The slide assembly (fig. 5-11) consists of a body to which are mounted rollers, which reduce friction during forward and aft movement of the assembly; the buffer hook, which engages the aircraft hold-back bar; and the buffer-hook actuator assembly. The slide assembly is mechanically connected to the buffer-cylinder piston rods by three links.

During operation, as the aircraft moves fomward, the launch bar, sliding in the track-guide grooves, contacts the buffer-hook-actuator-assembly roller, forcing it to rotate forward and down. The buffer-hook actuator lever, on which the roller is assembled, is forced against the underside of the buffer hook. This action raises the buffer hook into

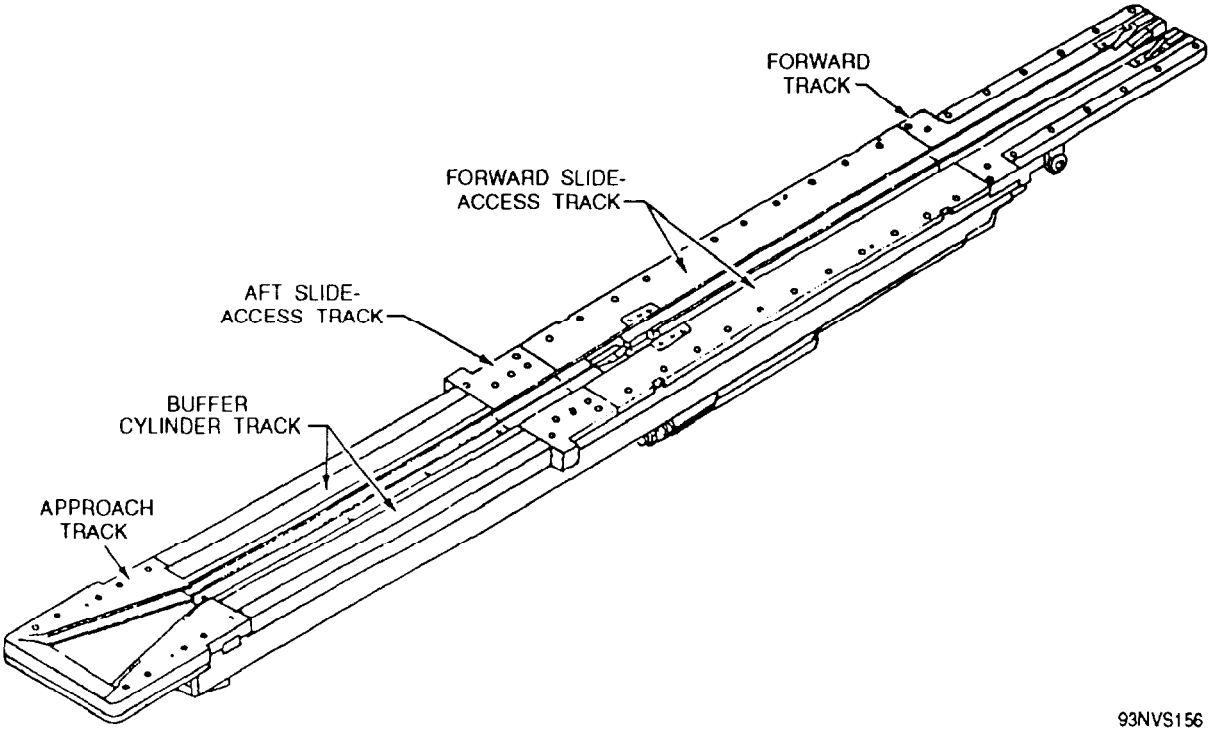

Figure 5-10.—Nose-gear-launch guide track.

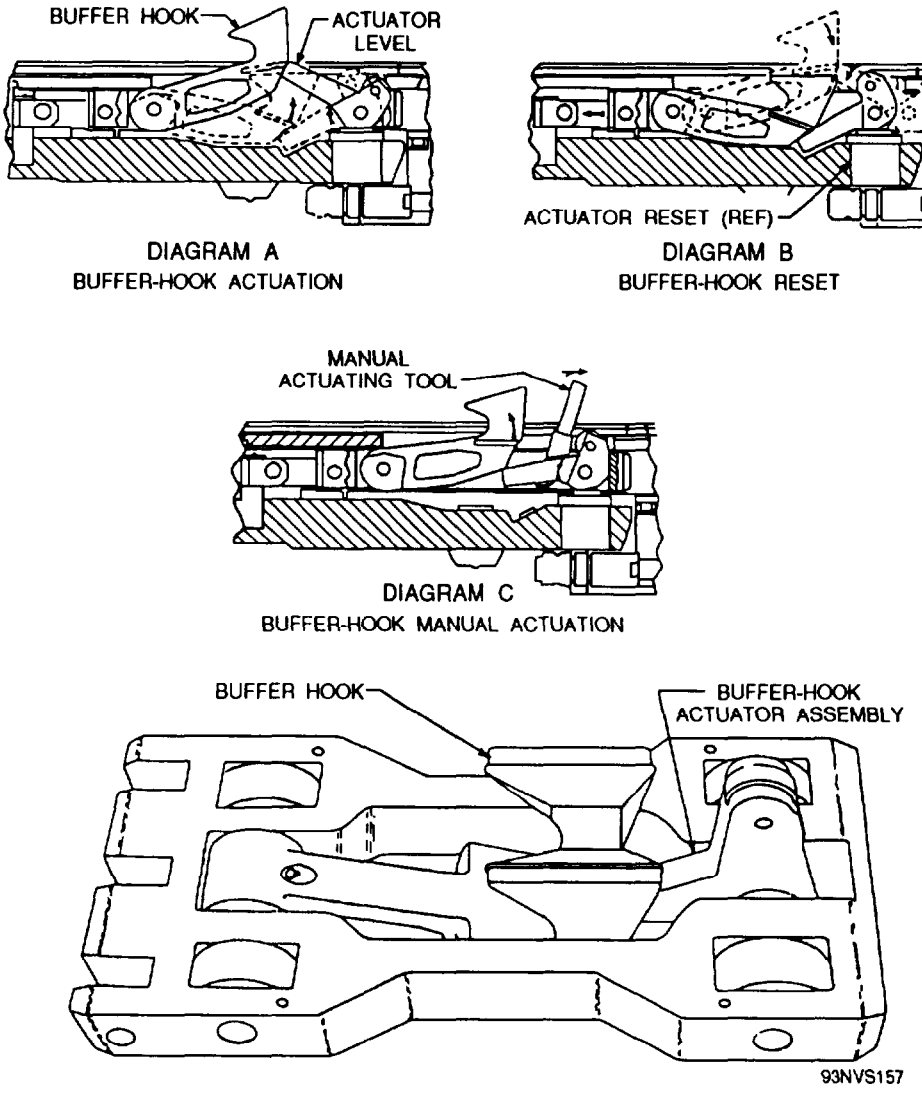

Figure 5-11.—Nose-gear-launch slide assembly.

position to engage the aircraft holdback bar (see diagram A, fig. 5-11). As the aircraft continues forward, the holdback bar engages the buffer hook. The moving aircraft pulls the slide assembly forward, thus pulling the buffer-cydinder piston rods forward out of the buffer cylinder assembly.

Hydraulic resistance within the buffer cylinder assembly decelerates the aircraft. When the aircraft stops, it is in position for launch bar/catapult spreader assembly hookup. After launch, the piston rods are retracted into the buffer cylinder assembly automatically. As the slide assembly moves aft, a tooth in the actuator assembly contacts the extended reset-assembly slider (see diagram B, fig. 5-11), causing the actuator lever to rotate down. This action permits the buffer hook to drop below deck level through an opening in the track into the deck housing.

NOSE-GEAR-LAUNCH ACTUATOR RESET ASSEMBLY

The actuator reset assembly (fig. 5-12), which resets the buffer hook, causing it to drop below deck at the end of the buffer-cylinder-assembly retract stroke, is located below the slide assembly in the deck housing. The assembly consists of a cylindrical housing, slider, slider actuating spring, and retainer. The slider contains a Stellite surface to lessen the effects of wear during contact with the slide-assembly reset roller, and a chrome-plated body to prevent corrosion. Grooves machined in

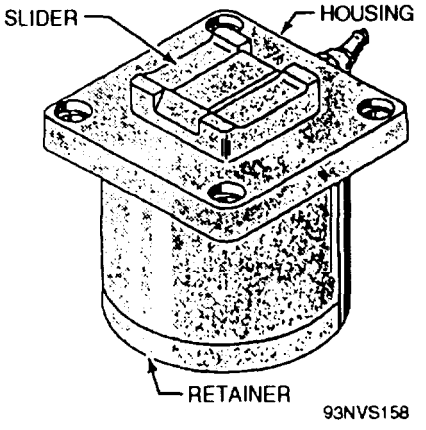

Figure 5-12.—Nose-gear-launch actuator reset assembly.

the slider provide for the flow of lubricant between the slider and the inner walls of the housing. The slider actuating spring is housed in a hole in the bottom of the slider. The slider and spring are secured in the housing by means of the retainer.

During operation when the slide assembly is forward, the reset-assembly slider is not restrained by the actuator assembly but is held above the surface of the housing by the slider actuating spring. After launch, as the slide assembly retracts, the actuator-assembly reset tooth contacts the reset-assembly-slider pad surface, causing the actuator assembly to rotate downward. This action permits the buffer hook to drop below the deck through the track opening into the deck housing cavity (see diagram B, fig. 5-11). When the buffer hook is below deck, the reset-assembly slider is held down in the housing by the actuator assembly.

NOSE-GEAR-LAUNCH BUFFER CYLINDER

The NGL buffer cylinder (see fig. 5-13) is in the deck housing between the NGL approach track and the aft slide-access track. The buffer-cylinder body has integral guide tracks on its top surface and contains three hydraulic cylinders. The two outer cylinders contain hollow piston rods; the center cylinder piston rod is solid. The forward end of each piston rod is attached to the NGL slide. Within each outer rod is an orifice tube, which meters fluid flow through the outer cylinders to absorb the forward energy of the aircraft hookup; the three piston rods are fully retracted into the cylinders, and hydraulic fluid is constantly circulated between the hydraulic system and the buffer cylinder, bypassing the cylinders through two metering orifice screws. This metered flow, which is nonadjustable, prevents overheating of the hydraulic fluid.

When the aircraft holdback bar engages the buffer hook, the slide assembly moves forward, pulling the three piston rods from the cylinders. As the rods move forward, fluid in front of each outer-cylinder piston is forced through the holes around the periphery of each outer-cylinder piston and through the metering holes in the two orifice tubes. As the pistons continue forward, the number

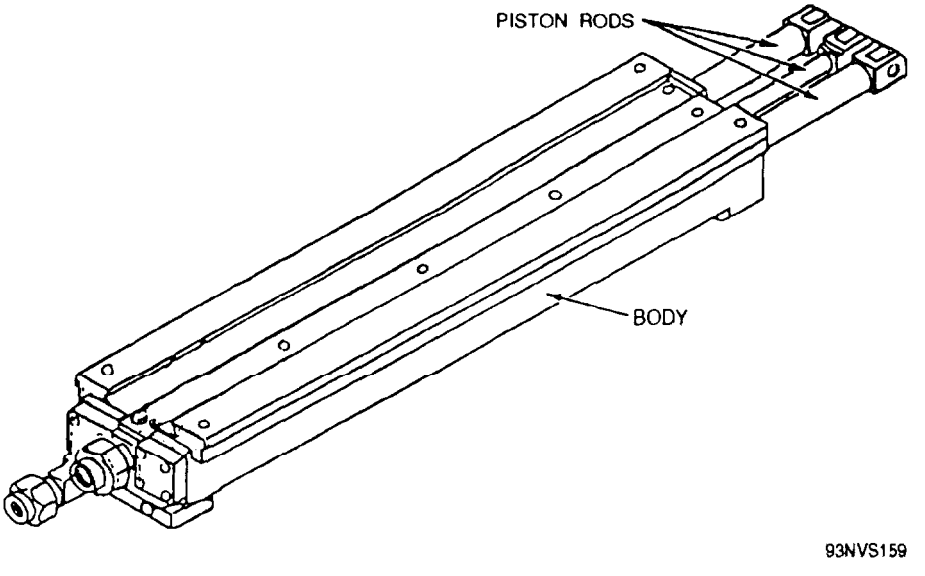

Figure 5-13.—Nose-gear-launch buffer cylinder.

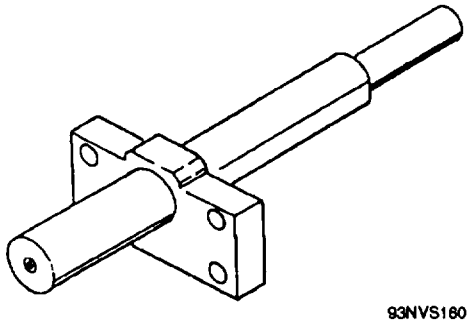

Figure 5-14.—Nose-ear-launch shock absorber assembly.

of metering holes in the orifice tubes is progressively reduced, causing an increasing resistance to forward motion of the slide assembly, thus decelerating and bringing the aircraft to a smooth stop at the end of the buffing stroke.

During the buffing stroke, fluid in front of the center-cylinder piston is forced through a port in the cylinder and through the hydraulic line into the NGL valve-manifold accumulator, which acts as a cushion and fluid reservoir. After launch, the fluid pressure established by the valve-manifold reducing valve acting on the forward side of the center cydinder forces the center piston aft, thus retracting the three rods into the cydinders.

NOSE-GEAR-LAUNCH SHOCK ABSORBER ASSEMBLY

The NGL shock absorber assembly (fig. 5-14) is mounted horizontally at the forward end of the NGL assembly. During the catapult retract cycle, the shock absorber provides uniform deceleration of the shuttle to bring it to a smooth, soft stop, eliminating impact forces that could cause damage to the grab assembly or the NGL assembly. The shock absorber is a self-contained, sealed unit and requires no maintenance or adjustments.

NOSE-GEAR-LAUNCH VALVE MANIFOLD

The NGL valve manifold (fig. 5-15) located below deck, consists of a support structure, two

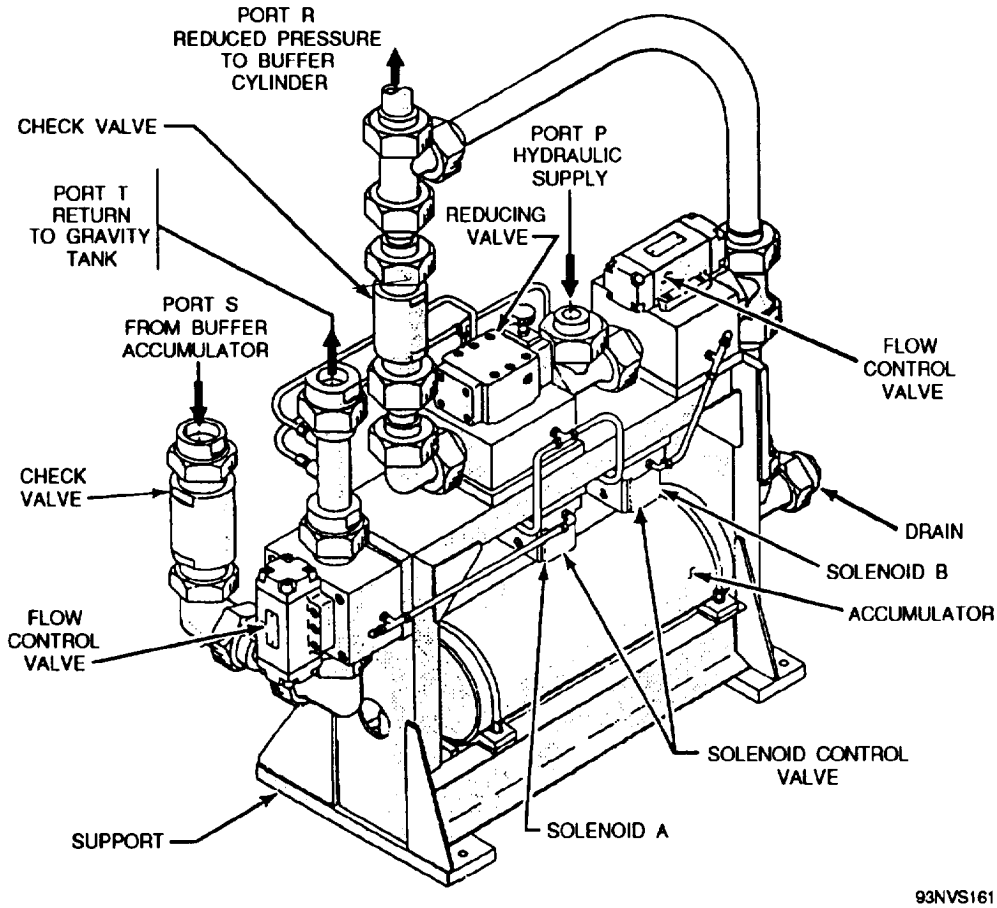

Figure 5-15.—Nose-gear-launch valve manifold.

two-way flow control valves, two four-way solenoid control valves, a reducing valve, a piston-type accumulator, a terminal box to house electrical connections, and associated piping. The valve manifold assembly controls fluid flow supplied from the hydraulic system to the buffer cylinder assembly.

NOSE-GEAR-LAUNCH BUFFER ACCUMULATOR

The NGL buffer accumulator is located below deck in line with and aft of the buffer cylinder. The buffer accumulator assembly consists of a hydraulic accumulator mounted in a support, and a tee fitting. The buffer accumulator supplies fluid to fill the void created as the buffer-cylinder piston rods move forward. The fluid is returned to the accumulator as the piston rods retract into the buffer cylinder.

NOSE-GEAR-LAUNCH CONTROL SYSTEM

The operation of the NGL equipment is automatic under normal operating conditions. The only controls provided are the BUFFER FWD and the BUFFER AFT push buttons found on the deckedge and emergency control panels (fig. 5-16) on non-ICCS vessels. On ICCS vessels they are found on the monitor control console, the central charging panel, or the emergency deckedge control panel. Panel selection is made by rotating a transfer switch (fig. 5-1 7) from its normal position to its emergency position.

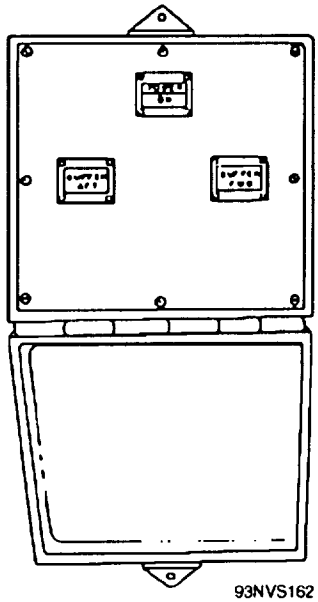

Figure 5-16.—Deckedge and emergency control panel.

Buffer Forward

The buffer forward push button is used during air aircraft launch abort operation to move the buffer hook forward of the holdback bar so that the release element and holdback bar can be removed from the aircraft.

When the BUFFER FWD push button is pressed, the buffer forward solenoid (A) is energized (fig. 5-15), shifting the buffer forward solenoid valve, allowing medium-pressure hydraulic fluid to shift the piston of the flow control valve. When the piston of the flow control valve shifts, fluid flow from the aft end of the buffer cylinder assembly to the gravity tank is shut off. This causes a pressure buildup on the aft end of the buffer cylinder assembly pistons. Since the area on the aft side of the pistons is larger than the area on the forward side, the pistons, piston rods, and attached slide assembly are driven forward.

Buffer Aft

The buffer aft push button is pressed during an abort operation when the aircraft holdback bar is connected to the buffer hook, the fluid pressure acting on the forward side of the buffer pistons will tow the aircraft aft. When the buffer has moved back 4 to 10 inches, the abort force is reduced because hydraulic pressure is bled off through exposed holes in the buffer-cylinder-assembly orifice tubes. Aircraft braking is required prior to releasing the push button to hold the aircraft against its thrust

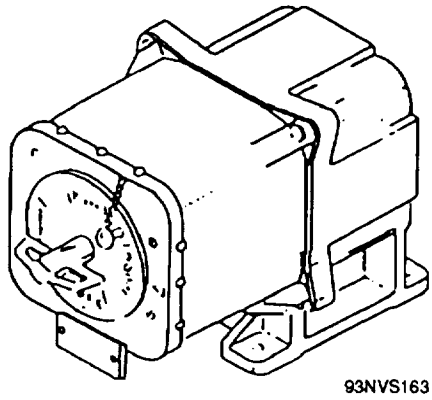

Figure 5-17.—Transfer switch.

load. When the NGL BUFFER AFT push button is pressed after the aircraft is removed from the catapult and the buffer hook is forward, hydraulic fluid pressure will return the pistons, piston rods, and slide assembly fully aft. When the slide assembly is retracted, the buffer hook returns to a position below deck.

When the buffer aft switch is pushed, the buffer aft solenoid valve shifts, allowing medium-pressure hydraulic fluid to shift the piston of the flow control valve. Medium-pressure hydraulic fluid flows through the flow control valve to the buffer cylinder assembly. Fluid pressure is applied to the forward side of the buffer pistons; and the pistons, piston rods, and slide assembly move aft. As the pistons move aft, fluid is forced out of the aft end of the buffer cylinder assembly, through a check valve and the other flow control valve, to the gravity tank.

Preparation for Use, Maintenance, and Testing

Prior to each period of operation, all preoperational inspections shall be conducted. All inspections, routine maintenance, or repairs must be conducted according to current MRCs and the procedures contained in the *Mark 2 Mod 0 Operation, Service, Maintenance, and Overhaul Instructions Manual,* NAVAIR 51-25-19.

SUMMARY

In this chapter we have discussed the functions and operating procedures for the JBDs and Mk 2 NGL equipment. We also described the bulletins used to hook up and launch aircraft from the catapults safely and correctly. For additional, in-depth descriptions of this equipment, see the applicable NAVAIR technical manuals.